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Understanding Society

**Towards the digital future of HR: exploring the relationship between techno-  
overload and work-life balance with leadership as a moderator**

Master Thesis Human Resource Studies

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## **Abstract**

With the increasing use of information and communications technology (ICT) in the modern day workplace, employees are increasingly experiencing the various impacts of techno-overload. This research aims to offer new insights related to the effects of techno-overload on work-life balance in combination with leader-member exchange as a moderator. Data was collected using an online questionnaire featuring 175 respondents, with analyses performed using SPSS and the PROCESS model by Hayes (2017). Findings reveal that employees who experience techno-overload are more likely to experience a negative work-life balance. Additionally, the moderating effect of leader-member exchange is limited to a partial moderation as only a positive leader-member exchange was found to buffer the negative relationship between techno-overload and work-life balance. This paper suggests a number of new directions for future research to pursue, while also discussing some of the limitations encountered in this study. Finally, practical implications offer a few actions managers could undertake to tackle the challenges mentioned.

## Introduction

The widespread use of ICT has become increasingly noticeable and important in the last few years. It has helped employees become more connected to their work beyond the traditional boundaries of work and non-work (Boswell & Olson-Buchanan, 2007). This has various advantages, for example in terms of cost saving and greater flexibility in dealing with work-related tasks (Wright et al., 2014). However, there are also negative consequences such as the increase in demands placed on employees by increasing workplace accessibility, greater productivity expectations or difficulties in maintaining a clear boundary between work and life (Kossek & Lautsch, 2008; O'Driscoll, Brough, Timms, & Sawang, 2010).

ICT brings new demands to employees in a number of ways. Nowadays, employees are experiencing a sense of constant connectivity, which extends the workday beyond the traditional office hours. Employees stay connected anywhere and anytime, communicating through mobile communication tools such as laptops, smartphones and web browsers (Ragu-Nathan, T. S., Tarafdar, Ragu-Nathan, B. S., & Tu, 2008). Employees are reporting that they feel an obligation to respond to new messages, while these messages are interrupting their attention and focus on work. As a result, employees are experiencing an increased work pressure and difficulty maintaining boundaries between work and personal life (Jarvenpaa & Lang, 2005; Rennecker & Godwin, 2005). These developments can be considered part of the techno-overload phenomenon. Techno-overload refers to ICT's potential to make employees work faster and longer (Tarafdar, M., Tu, Q., Ragu-Nathan, B. S., & Ragu-Nathan, T. S., 2007). Common examples given by employees are the desire to limit their information intake, the need to disconnect from work, and not wanting to constantly check work related emails (Harris, K. J., Harris, R. B., Carlson, J. R., Carlson, D. S., 2015).

Employees who experience techno-overload are found to be more likely to respond to emails, texts, or calls during non-work hours such as free time or even during vacation (Wright et al., 2014). This increased connectivity brought forward by ICT has led to the boundaries between work and non-work, also known as work-life balance, to become increasingly blurred. A healthy work-life balance can be defined as employees who balance work and non-work role demands, with minimal conflict between roles, while the experiences in one domain contributes performance and satisfaction in the other domain (Frone, 2003; Greenhaus & Allen, 2010; Valcour, 2007). With workplaces likely to become more technologically advanced in the future, this study aims to investigate the effects of techno-overload on work-life balance.

The relationship between techno-overload and work-life balance can be explained using the conservation of resources theory (COR) (Hobfoll, 1989). This theory argues that people attempt to defend, maintain, and build resources which they value. When they feel like these valued resources are threatened, lost, or have not gained while investing in them, they may experience psychological stress. Therefore, people seek to conserve their resources in order to limit their stress (Hobfoll, 1989). People experiencing techno-overload are accustomed to using ICT for after-hours work purposes, such as to manage resources that were lost or threatened at work (Ďuranová & Ohly, 2016). As such, having to manage these threatened resources during non-work hours starts becoming more prevalent, possibly negatively affecting the work-life balance (Harris et al., 2015).

Leadership plays an important role in the management of resources, and therefore could also play an important role in the relationship between techno-overload and work-life balance. Leaders are able to provide their employees with resources, while also minimizing job demands (Schaufeli, 2015). Recent research has started exploring different leadership styles concerning

digital leadership, comparing the various effects of leaderships in an ICT context (Petry, 2018). Due to its emphasis on resource management and thereby its link to COR theory, this study chooses to focus on the role of leader-member exchange (LMX). LMX argues that there is a unique dyadic relationship between each team member and leader, leading to so-called high quality and low quality relations (Graen & Uhl-Bien, 1995). High-quality relations receive more favorable treatment, advantages, and increased trust and support in comparison to their low-quality counterparts (Liden, Sparrowe, & Wayne, 1997). These differences can be considered resources, and following the notion of COR theory one could expect the high-quality relations to have an easier time maintaining their resources compared to low-quality relations, thus buffering the negative relation between techno-overload and work-life balance.

Overall, the aim of this study is to identify the relationship between techno-overload and its effect on work-life balance. Moreover, it questions the moderating effect of the LMX between leaders and members. With the above in mind, this present study offers a number of theoretical contributions. Firstly, the use of ICT in the workplace is found to have both positive and negative effects on employees' work experiences (Day, Scott, & Kelloway, 2010; O'Driscoll et al., 2010). Yet there is little empirical evidence identifying specific ICT demands and supports (Day, Paquet, & Scott, & Hambley, 2012). Moreover, much less is currently known about the impact of different kinds of technology driven stressors on employee attitudes (Ragu-Nathan et al., 2008). To that end, this study offers more specific insights in the effects and consequences of ICT use in the form of techno-overload on the slowly fading distinction between work and non-work. Furthermore, current literature focuses on the specific dimension of work-family conflict (WFC). This can be considered an oversimplification of people's work and non-work (social) roles, as they do not include individuals without a partner, those part of nontraditional family structures,

or those who have a different focus in their non-work lives than their family (Valcour, 2007). Instead, work-life balance aims to widen this scope to include various forms of nonwork domains, thereby becoming more inclusive to a variety of employees.

Regarding the practical contributions, organizations and employers should take great interest in the unforeseen consequences of modern work situations imbedded with ICT. Boyd, Lewin, and Sager (2009) estimate that these consequences could cost up to US\$300 billion annually in the United States alone. With the use and integration of ICT ever increasing, the corresponding issues and negative consequences could be expected to rise accordingly, possibly increasing this annual cost in the years to come. Therefore, is crucial for both employers and employees to recognize how techno-overload and work-life balance issues are caused, in order to prevent or limit their effects as much as possible.

This leads to the following research question: *“To what extent is techno-overload related to employees’ work-life balance and how is this relation moderated by the LMX between an employee and their manager?”*

## **Theoretical Framework**

### **Techno-overload and work-life balance**

The rise of widespread ICT use has drawn attention to the phenomenon of techno-overload. Techno-overload is one of five techno-stressors, namely techno-overload, techno-invasion, techno-complexity, techno-insecurity, and techno-uncertainty (La Torre, Esposito, Sciarra, & Chiappetta, 2019). The scope of this study focuses on the dimension of techno-overload. Tarafdar et al. (2007) describes techno-overload as ICT’s potential to make employees work faster and longer. More precisely, techno-overload can be defined as the extent by which employees perceive technology-related task performance demands to be excessive, alongside the

feeling that computers have intensified the experienced workload (Iverson, Deery, & Erwin, 1995). For employees using ICT, techno-overload can be considered being increasingly present as employees today deal with greater accessibility to computer communication (e.g. text messages, email) and information systems. As such, this increased level of connectivity may result in employees experiencing feelings of having extra work, being “on-call” during their free time, and perceiving technology-related work overload in general (Harris, K. J., Lambert, & Harris, R. B., 2013). Following these developments, many employees are starting to report experiencing symptoms of technology overload. Common examples given by employees are the desire to limit their information intake, the need to disconnect from work, and not wanting to constantly check work related emails (Harris et al., 2015).

The effects of techno-overload can be found in the blurring boundaries between work and nonwork life, also known as work-life balance. Employees suffering from techno-overload are experiencing difficulty maintaining boundaries between work and personal life (Jarvenpaa & Lang, 2005; Rennecker & Godwin, 2005). As boundaries start to fade and the integration between work and life becomes greater, employees who experience techno-overload at work could start experiencing techno-overload at home as well (Wright et al., 2014). This study chooses to study work-life balance in particular, as it captures the spillover of the work domain into private life as a whole. Specifically, work-life balance recognizes the various social roles employees hold in both work (e.g. coworker, supervisor) and non-work (e.g. parent, partner, friend) (Kossek, Valcour, & Lirio, 2014). Work-life balance can be defined as employees who successfully balance work and non-work role demands, with minimal conflict between roles, while the experiences in one domain benefits performance and satisfaction in the other domain (Frone, 2003; Greenhaus & Allen, 2010; Valcour, 2007). The use of the term “balance” does not

mean that employees are expected to invest an equal amount of time in both roles, yet rather the investment of time and attention suitable to each individual at any given time (Kossek et al., 2014). Accordingly, it is important to stress that achieving balance is subjective and differs for each individual (Kossek et al., 2014). Achieving a healthy work-life balance is a broad challenge for all working people, since it pursues being able to do well at things we care about. Therefore, it is important to discover what effects techno-overload may have on employees' work-life balance, and how these effects could be explained.

A theory that explains the effects of techno-overload on an employee's work-life balance is the conservation of resources (COR) theory (Hobfoll 1989; 2011). This theory argues that people attempt to defend, maintain, and build resources which they value. When they feel like these valued resources are threatened, lost, or have not gained while investing in them, they may experience psychological stress. Consequently, people seek to conserve their resource in order to limit their stress (Hobfoll, 1989). When considering the COR theory, an assumption could be made that nowadays employees use ICT for after-hours work purposes, such as to manage resources that were lost or threatened at work (Ďuranová & Ohly, 2016). Therefore, employees invest extra compensatory effort to avoid stress. However, by exposing themselves to extra compensatory efforts too long or too frequently employees run the risk of high physiological (e.g. high vulnerability to stress and disease) and high psychological costs, thereby actually increasing their experienced stress (Hobfoll & Freedy, 1993; Gorgievski & Hobfoll, 2008). However, these heightened stress levels could also be worsened by existing problems caused by ICT, including techno-overload. Employees experiencing techno-overload can be expected to use their valuable resources to process the vast amount of information, working with complex systems, and dealing with communication overload associated with techno-overload. With an

increase in interconnectivity, ICT use and the rising experiences of techno-overload, employees will find themselves increasingly investing their valued resources (e.g. effort, energy, time) while receiving little in return (Harris et al. 2015).

The growth of ICT has created the opportunity to work anywhere at any time (Fenner & Renn, 2004). The integration between work and life has become greater, and as such employees who experience techno-overload at work could start experiencing techno-overload at home as well. For example, a study by Leonardi, Treem, and Jackson (2010) found that some employees experience feelings of reduced control over work because of the increased amount of ICT present in the workplace. This lack of control is caused by unanticipated work-related emails and text messages, alongside the unclear expectations of responses during an employee's free time, which has been found to increase employee stress (Wright et al., 2014). These examples may help explain the effects of techno-overload on work-life balance. Therefore, one could argue that an increase in techno-overload and the corresponding resource loss will be negative related to the perceived work-life balance of the employees. Based on these arguments, the following hypothesis is formed:

*Hypothesis 1: Techno-overload is negatively related to work-life balance.*

### **Leader-member exchange**

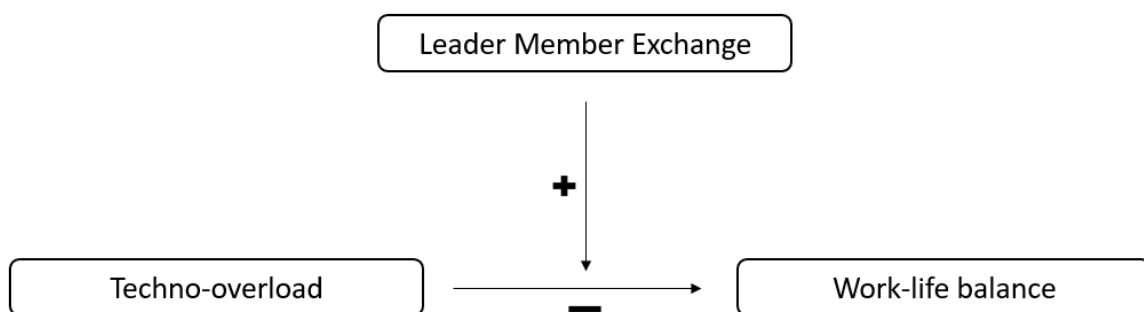
As argued above, techno-overload is expected to have a negative relation with work-life balance. However, this relation may differ depending on an employee's relation with their leader. Leaders can play an integral role in the managing of employees' resources, which is central to COR theory, as leaders provide direction, tasks, priorities, task instructions, and offer social and work-related support (Harris et al., 2015). This study chooses to focus on LMX to analyze the role of leadership. The LMX theory is based on the notion that there is a unique relationship

between each member and leader (Graen & Uhl-Bien, 1995). Contrary to the belief that leaders exhibit the same traits and behaviors towards all staff members, the LMX theory argues that there is a dyadic relationship between each individual leader and member (Graen & Uhl-Bien, 1995). More specifically, there exists a notion of interpersonal bias where some leader member relationships tend to be of a higher quality (e.g. leader's favorites), while other relations tend to be of lower quality (e.g. personal dislike between leader and member) (Graen & Uhl-Bien, 1995). Members part of the higher quality relations are found to receive favorable treatment, gain advantages from their supervisors that their lower quality colleagues do not, and experience increased trust and support (Liden et al., 1997). Members of the lower quality relations are found to receive fewer non-required social or job related support (Dienesch & Liden, 1986; Graen & Uhl-Bien, 1995). Linking this to COR theory, the differences in treatment and the associated personal advantages and disadvantages could be described as differences in how team leaders help team members manage their resources. In other words, high-quality LMX feature team members receiving more support from their team leaders in managing their resources as compared to employees who are part of a low-quality LMX.

Linking COR theory to LXM could also help explain its effect on the relationship between techno-overload and work-life balance. This paper argues that a high-quality LMX can be expected to buffer the relationship between techno-overload and work-life balance, while a low-quality LMX can be expected to strengthen this negative relationship. Employees who are suffering from techno-overload will start investing resources to maintain a balance and prevent spillover. Leaders, especially those who are part of a high quality LMX relationship, have the capabilities to help employees in managing their threatened resource management and thereby limit the negative consequences of techno-overload. Examples include team leaders who limit

the amount of messaging allowed during weekend among team members, taking over responsibilities which cross the work-life boundary, or giving guidance on how to effectively manage high volumes of information (Jerejian, Reid, & Rees, 2013). The buffer of the relationship between techno-overload and work-life balance can be explained when employees experiencing a high-quality LMX have less of their work-related overload spill over into their non-work lives. On the flipside, employees with a low-quality LMX may not receive the same resource maintaining and may experience an increase in isolation when dealing with work spilling over into their non-work lives (de Vries, Tummers, & Bekkers, 2019). Leadership can be considered a crucial factor in how employees experience techno-overload in relation to their work-life balance. This leads to the following hypothesis:

*Hypothesis 2: LMX moderates the relationship between techno-overload and work-life balance to the extent that that the negative relationship between techno-overload and work-life balance is weaker when LMX is higher.*



*Figure 1. Conceptual model.*

## **Methods**

### **Research design and procedure**

In order to test the hypotheses presented in this study a quantitative study has been designed. Data was gathered among individuals at a single point in time. This study is part of a larger research on the different consequences of techno-stress in relation to the role of leadership. The data collection has therefore been carried out by a group of six students from Tilburg University's master program Human Resource Studies. First, respondents were invited to participate in the research by providing the contact information of the participants of their team. The researchers used their own personal network to find possible participants, using social media such as Facebook, LinkedIn, through the use of WhatsApp or simply through face-to-face personal contact. The sampling method chosen by the researchers is convenience sampling, as the research was carried out through inviting any group of employees available to the researchers' personal network (Given, 2008). The questionnaires were distributed through Qualtrics, an online software provide by Tilburg University for data collection purposes. Before data collection could commence, the contents of the online survey had been evaluated and approved by the Tilburg School of Social and Behavioral Sciences (TSB) Ethics Review Board.

### **Population and sample**

The population of this sample consists of employees 16 years and older, with no regards to sector, industry, or business restrictions. In particular, employees working in teams with multiple team members and a team leader were contacted to join this study. The concept of team members and team leaders has been narrowed down to teams consisting of four or more employees working in the same organization. These groups of employees are considered by the organization as a team working together, and regular physical and/or virtual contact among team

members and with the team leader is required. In total, 342 respondents were invited to partake in this study. The demographic characteristics of the sample are presented below in table 1. A total of 175 respondents took part in this study. A majority of the respondents was female, with 54.30% female respondents and 45.70% male respondents. The average age of the participants in this study is 37.43 ( $SD = 12.27$ ). Additionally, a majority of the employees have a full-time contract with 68%, while only 32% have a part-time contract. Regarding education background, 39.40% has a general secondary education, 36% has a higher education, 21.1% has a technical education, and only 3.4% has a primary or vocational education. Finally, 32.2% of employees are working in the business services sector, 25.9% in healthcare, 11.5% in both production and other sectors, 10.9% in education, 4.6% in government, and only 3.4% in hospitality.

**Table 1.***Demographic characteristics of the respondents in this study*

<i>Control variables</i>	<i>Percentages and average age (in years) of this study</i>
Male	45.70%
Female	54.30%
Average age	37.43
Full-time employment	68.00%
Part-time employment	32.00%
Education level	
<i>Primary/vocational education</i>	3.40%
<i>Technical education</i>	21.10%
<i>General secondary education</i>	39.40%
<i>Higher education</i>	36.00%
Employment sector	
<i>Business services</i>	32.20%
<i>Education</i>	10.90%
<i>Production</i>	11.50%
<i>Government</i>	4.60%
<i>Healthcare</i>	25.90%
<i>Hospitality</i>	3.40%
<i>Other</i>	11.50%

*N = 175***Measures and instruments**

In order to test the hypothesis presented in this study, a number of requirements had to be met. The constructs were measured using prior-validated scales which have been developed by other researchers. Firstly, the scales had to be checked whether they were suitable for factor analysis. The Kaiser-Meyer-Olkin Measure for sampling adequacy (KMO) needs to be a value higher than .50 to be considered acceptable (Field, 2013). Furthermore, the Bartlett's test of Sphericity needs to be significant ( $p < .05$ ). Due to the presence of latent variables, an exploratory factor analysis is required. Principal axis factoring (PAF) is performed to create variables with a maximum interindividual variance (Fabrigar & Wegener, 2011). Scales with findings of low communalities ( $< .3$ ) will need to be deleted (Tabachnick & Fidell, 2013). Once

these requirements were passed, the scales were deemed fit for PAF. Finally, a reliability analysis has been performed. When performing the reliability analysis, the scales are required to have a Cronbach's alpha of .70 or higher. Items which would lead to a significant increase in scale reliability when deleted will be removed from the scale (Pallant, 2013). The full items and factors loadings are presented in Appendix A.

*Techno-overload* – In order to measure techno-overload, a five item scale by Ragu-Nathan et al. (2008) was used. The items were answered on a seven-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). One of the sample items is “I am forced by this technology to do more work than I can handle”. Both the team leaders and team members were asked to respond to this question. Principal axis factoring was performed on the five items. A scree plot revealed that there is only one factor, and as such no rotation was required. Results from the KMO measure confirms the sampling adequacy of the analysis (KMO = .83) as it is higher than the acceptable limit of .5. Additionally, the Bartlett's test of Sphericity ( $p < .01$ ) is significant which reveals that the correlations between items are large enough for the principal axis factoring. Regarding the reliability, a reliability analysis has been performed. The scale is considered reliable ( $\alpha = .87$ ), with none of the items within the scale being deleted as it would decrease the scale reliability.

*Work-life balance* – In order to measure work-life balance, a five item scale by Valcour (2007) was used. The items were answered on a seven-point Likert scale ranging from 1 (very dissatisfied) to 7 (very satisfied). One of the sample items is “Your ability to balance the needs of your job with those of your personal or family life”. Both the team leaders and team members were asked to respond to this question. Principal axis factoring was performed on the five items. A scree plot revealed that there is only one factor, and as such no rotation was required. Results

from the KMO measure confirms the sampling adequacy of the analysis (KMO = .85). Furthermore, the Bartlett's test for Sphericity is also significant ( $p < .01$ ). Regarding the reliability, a reliability analysis has been performed. The scale is considered reliable ( $\alpha = .94$ ), with none of the items within the scale being deleted as it would decrease the scale reliability.

*LMX* – In order to measure LMX, a 3 item scale by de Vries, Tummers, and Bekkers (2019) was used. The items were answered on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). One of the example items is “Today, my supervisor understood my problems and needs.” The question formulation provided to respondents differs for team members and team leaders, as team members were asked to respond on the relationship with their team leader and vice versa. Principal axis factoring was performed on the three items. A scree plot revealed that there is only one factor, and as such no rotation was required. Results from the KMO confirms the sampling adequacy of the analysis (KMO = .74). Additionally, the Bartlett's test for Sphericity has been found to be significant ( $p < .01$ ). Regarding the reliability, a reliability analysis has been performed. The scale is considered reliable ( $\alpha = .90$ ), with none of the items within the scale being deleted as it would decrease the scale reliability.

*Control variables* – In order to investigate the effects of external influences on the relationship in this study, control variables were included in the analysis. The control variables included are intended to control for resources and demands that are either capable of impacting the work-life balance or influencing a change in ICT demands in relation to techno-overload. First, a distinction needs to be made between full-time employees and part-time employees. This distinction has been made based on contract type (0 = part-time, 1 = full-time). One could argue that the balancing of work and life is more difficult for full-time employees, as they spend more time working. Research has found that as weekly working hours increases, work-life balance was

found to be more worse (Dex & Bond, 2005). Additionally, the negative consequences associated with techno-overload may have less effect on employees who work less, as they would have more time to recover and thereby maintain their resources as posed by COR theory (Hobfoll, 1989). Secondly, the employees' employment sector was added as a control variable. Different industries' demands may have varying ways of providing resources or have different demands which impact an employee's work-life balance. For example, some argue that there may be differences between the private and public sector, where the private sector is associated with an increase in work-life problems resulting in a more negative work-life balance (Dex & Bond, 2005). Employment sector is divided into seven categories (1 = business services, 2 = education, 3 = production, 4 = government, 5 = healthcare, 6 = hospitality, 7 = other). Thirdly, education level was added as a control variable. With regards to education, Meyer and Maltin (2010) suggest that more highly educated employees might have higher career ambitions, which would result in increased stress levels and more difficult in maintaining a work-life balance. Education level refers to the highest obtained education level by the respondent and is divided into four categories (1 = primary/vocational education, 2 = technical education, 3 = general secondary education, 4 = higher education). For both education level and employment sector dummy variables were created, with higher education as the dummy for education level and business services as the dummy for employment sector. Finally, age and gender were controlled for. Research has found that as age increases, older employees report a better maintenance of a positive work-life balance (Richert-Kaźmierska, & Stankiewicz, 2016). Concerning gender, Riedl (2012) argued that men are more susceptible to develop higher levels of stress compared to women. Gender is coded as a dummy variable, with 0 = women and 1 = men.

## Analysis

To test the hypotheses of this study, the data gathered by Qualtrics was exported to IBM SPSS Statistics 24. To test the hypotheses in this study, first a correlation analysis was performed. This analysis is used to evaluate the strength of the relationship between two variables with the Pearson correlation coefficient. The Pearson correlation coefficient ranges from 0 to 1, where a higher value reveals a stronger correlation between these variables. Additionally, Spearman correlation was used for both gender and employment type due to their categorical nature (Benesty, Chen, Huang, & Cohen, 2009). Following the correlation analysis, a linear regression analysis was performed. A linear regression analysis shows whether there is a correlation present between the independent variable techno-overload and the dependent variable work-life balance. Prior to the testing of the second hypothesis, an interaction variable was created through the combination of techno-overload and LMX. This interaction variable was created in order to analyze the moderation effect of LMX on the relationship between techno-overload and work-life balance. In order to test this moderation process, the PROCESS macro designed by Hayes (2017) was used, which facilitates the moderation analysis. Further analysis with the PROCESS macro (Hayes, 2017) included a conditional effect to investigate the possibility of partial moderation. This conditional effect divided LMX into a higher rated group ( $SD + 1$ ) and a lower rated group ( $SD - 1$ ). Finally, a simple slopes test was performed using the PROCESS macro by Hayes (2017). A simple slope test is a conditional hypothesis test which helps determine whether the relationship between techno-overload and work-life balance becomes significant at a particular value of LMX (Aiken & West, 1991).

## Results

### Descriptive statistics and correlations

The following section discusses the outcomes of the data analysis. The means, standard deviations, and correlations of all variables in this study are presented in table 2. In addition, the values of the variance inflation factors (VIF) of these variables ranged from 1.14 to 1.85. As such, the assumption of no multicollinearity was met since none of the variables reported VIF values exceeding 10 (Kline, 2015). Regarding the hypotheses presented in this study, a few correlations need to be discussed. As hypothesized, techno-overload was negatively correlated to work-life balance ( $r = -.26$ ;  $p < 0.01$ ). Additionally, leader-member exchange has been found to positively correlate with work-life balance ( $r = .28$ ;  $p < 0.01$ ). These findings would indicate support for the first hypothesis in this study. Regarding the control variables, no significant correlations were found for age, sex, and employment type. However, significant differences have been found using ANOVA analyses for education level and sector.

**Table 2.** *Descriptive statistics and correlations*

	Variable	M	SD	1	2	3	4	5
1	Age	37.43	12.27					
2	Employment type (full-time) <sup>a</sup>			-.01				
3	Gender (male) <sup>a</sup>			.24**	.31**			
4	Work-life balance	5.15	1.16	.07	-.13	-.03		
5	Techno-Overload	3.63	1.29	-.01	.14	.14	-.26**	
6	Leader-member exchange	5.43	1.10	-.06	-.02	-.12	.28**	-.06

Note. N = 172. \*\* p < .01, \* p < .05.

<sup>a</sup> These are dummy variables coded as gender (0 = female; 1 = male), and employment type (0 = part-time, 1 = full-time)

Bivariate relations for Education level and Sector are not shown. ANOVA test revealed significant differences in education level for WLB (F = 4.71; p < .01), Techno-overload (F = 2.78; p < .05, but not for LMX (F = 1.19; p > .05). Additional ANOVA tests revealed no significant differences in sector for WLB (F = .48; p > .05), Techno-overload (F = .69; p > .05) and LMX (F = 1.74; p > .05).

## **Techno-overload and work-life balance**

In order to assess the relationship between techno-overload a multiple regression was performed. First, a null model was created in order to test work-life balance in combination with the control variables gender, age, employment type, education, and sector. Then, a second model was created to include techno-overload and LMX. Finally, a third model was created to include the interaction effect of LMX and techno-overload on work-life balance. The regression results including all models are shown below in table 3. Each model displays the regression coefficient (b) and the standard error (SE). The coefficient of determination (R<sup>2</sup>) reveals how much of the variance in work-life balance is explained by the independent variables for each model. The adjusted R<sup>2</sup> is called the adjusted coefficient of determination.

The first hypothesis is: “*Techno-overload is negatively related to work-life balance.*” The R<sup>2</sup> in model 2 shows that 25% of the variance in work-life balance can be explained by the control variables, independent variables and the interaction variable. Table 2 shows that a significant negative effect was found between techno-overload and work-life balance when controlling for the control variables (b = -.19; p < .01). These findings support the first hypothesis, and therefore the first hypothesis has been accepted.

## **The moderating role of LMX**

The second hypothesis is: “*LMX moderates the relationship between techno-overload and work-life balance in such a way that the negative relationship between techno-overload and work-life balance is weaker when LMX is high, compared to when LMX is low.*” To test the

moderating role of LMX, the interaction effect of LMX and techno-overload was added in model 3. The  $R^2$  in model 3 shows that 26% of the variance in work-life balance can be explained by the control variables, independent variables and the interaction variable. However, the  $R^2$  increase was found to be not significant when introducing the interaction variable ( $F = .86$ ;  $p > .05$ ). Individually, both techno-overload ( $b = -.19$ ;  $p < .01$ ) and LMX ( $b = .29$ ;  $p < .01$ ) were found to have significant effects on work-life balance when controlling for the control variables. As such, while not part of the hypotheses in this study, a significant positive effect for LMX on work-life balance has been found. However, when combined as an interaction variable no significant effect was found when controlling for control variables ( $b = -.05$ ;  $p > .05$ ). These findings do not support the second hypothesis, and therefore the second hypothesis has been rejected. Further testing was done using the simple slopes analysis in order to explore whether the moderating effect of LMX on the relationship between techno-overload and WLB is significant for certain values. The results of this analysis are displayed in table 4. When testing for a conditional effect, no significant effect was found for the effect of a lower rated LMX ( $b = -.14$ ;  $p > .05$ ). However, a significant effect was found for the effect of a higher rated LMX ( $b = -.24$ ;  $p < 0.05$ ). As such, these findings reveal that LMX partially moderates the relationship between techno-overload and WLB when controlling for the control variables in the case of a high LMX.

**Table 3.** Regression results on work-life balance

	Model 1		Model 2		Model 3	
	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>
<b>Control variables</b>						
Gender	-.10	.19	.03	.18	.01	.20
Age	.00	.01	.00	.01	.00	.01
Employment Type	-.23	.22	-.19	.20	-.18	.22
Sector						
<i>Business Services (ref.)</i>	-	-	-	-	-	-
<i>Education</i>	-.21	.32	-.40	.30	-.38	.36
<i>Production</i>	.04	.31	.07	.29	.07	.31
<i>Government</i>	-.41	.44	-.58	.42	-.56	.47
<i>Healthcare</i>	.07	.23	-.01	.22	.01	.21
<i>Hospitality</i>	.83	.50	.68	.47	.66	.35
<i>Other</i>	-.16	.32	-.04	.30	-.05	.33
Education level						
<i>Primary Education</i>	-.99	.55	-.99	.52	-.89	.55
<i>Technical Education</i>	.77**	.28	.73**	.27	.69*	.28
<i>General Secondary Education</i>	.45	.23	.43*	.21	.44	.23
<i>Higher Education (ref.)</i>	-	-	-	-	-	-
<b>Research variables</b>						
Techno-overload			-.19**	.07	-.19**	.07
LMX			.30**	.08	.29**	.09
Techno-overload x LMX					-.05	.06
R <sup>2</sup>	.13		.25		.26	
Adjusted R <sup>2</sup>	.06		.19		.18	
df	169		169		169	
F	1.92		3.74		4.05	

Note. N = 170. \*p < 0.05; \*\*p < 0.01. Model 1 and 2 were analysed using OLS regression. Model 3 was analysed using PROCESS macro model 1 (Hayes, 2013). Reference category for sector is business services. Reference category for education is higher education.

**Table 4.** Conditional effects of techno-overload on WLB for different LMX values

Variable	Moderator value	SD - Mean	B	SE	p	LLCI	ULCI
LMX	4.32	-1	-1.42	.09	.14	-.32	.05
	5.42	0	-.19	.07	.01	-.33	-.05
	6.52	+1	-.24	.11	.03	-.46	-.03

Note. N = 170. Executed by using PROCESS macro model 1 (Hayes, 2013). Values of the moderator LMX are one standard deviation below and above the mean

## Additional analysis

Taking the results surrounding the insignificant findings for the moderating effect of LMX into consideration, an additional analysis could provide a new explanation. Rather than directly buffering the relationship between techno-overload and WLB, arguments could be made for LMX functioning as a mediator. Following the reasoning of COR theory, leadership could be considered as an antecedent in the way employees manage the balance of balancing, building, and maintaining their resources. Specifically, leaders provide their employees with resources (e.g. job control, task variety, trust and justice) while minimizing job demands (e.g. work-life interference, work overload) (Schaufeli, 2015). In short, LMX could function as an antecedent in the way employees manage to balance their resources and demands. Having a higher LMX could have a positive relationship with both the employees' work-life balance and techno-overload through aiding them in balancing their resources. The results of the mediating role of LMX are presented in table 5. There is no significant relation between techno-overload and LMX, therefore no significant mediation effect has been found ( $b = -1.42$ ;  $p > .05$ ).

**Table 5.** *Additional analysis on mediation effect*

<b>Outcome Variable</b>	<b>Predictor variable</b>	<b>b</b>	<b>SE</b>	<b>p</b>	<b>LLCI</b>	<b>ULCI</b>
LMX	Techno-overload	-1.42	.07	.16	-.23	.04
WLB	Techno-overload	-.19	.07	.01	-.32	-.06
	LMX	.30	.08	.00	.15	.46

*Note.* N = 170. Executed by using PROCESS macro model 4 (Hayes, 2013).

## Discussion

The aim of this study was to examine whether employees who experience techno-overload are more likely to experience a negative work-life balance. Furthermore, it aims to discover whether leader-member exchange could buffer this negative relationship between employees who experience techno-overload and their work-life balance. As was hypothesized, the findings suggest that techno-overload negatively affects an employee's work-life balance. Additionally, a positive effect was found between LMX and work-life balance. However, the findings did not support the expectations of LMX functioning as a buffer for the negative relationship between techno-overload and WLB. Instead, results indicate that only a positive LMX manages to function as a buffer for the negative relationship between techno-overload and WLB. In addition, differences were found in work-life balance per education levels. These findings will be discussed further on in detail.

The findings of this study support the hypothesis that employees who experience techno-overload are more likely to experience a negative work-life balance. This is in line with past research, which argues that as boundaries start to fade and the integration between work and life becomes greater, employees who experience techno-overload at work could start experiencing techno-overload at home as well (Wright et al., 2014). Central to linking these phenomena is the management of resources, as employees feel a sense of reduced control over work in situations with increased amount of ICT presence in the workplace (Leonardi et al., 2010). This is supported by COR theory, which explains that employees seek to defend, maintain, and build valuable resources in order to limit their stress (Hobfoll, 1989). Consequently, the findings of this study support the notion that employees that use ICT after hours for work purposes experience implications for their work-life balance (Harris et al., 2015).

A specific contribution of this study was the focus on WLB rather than WFC. This enables a more personal view of what ones non-work life should look like, with achieving a balance being a more individually unique challenge. In creating one's personal balance, Kofodimos (1993, p. 8) writes that this balance consists of "finding the allocation of time and energy that fits your values and needs, making conscious choices about how to structure your life and integrating inner needs and outer demands and ... honoring and living by your deepest personal qualities, values and goals." Considering work-life balance is a broad issue relevant for all working people, creating a more fitting and modern distinction between work and non-work rather than the limited view of work-family offers an important theoretical contribution.

No evidence was found for LMX buffering the negative relationship between techno-overload and work-life balance. Instead, results reveal the presence of a partial moderation. In particular, only a high-quality LMX buffers the negative relationship between techno-overload and work-life balance. Furthermore, evidence was also found for a significant relationship between LMX and work-life balance. As such, one could argue that leadership could play an important role in how employees manage their work-life balance, while having less influence on the techno-overload part of this relationship. A possible explanation could be found in the very nature of both LMX and work-life balance. A key part of LMX is the notion that team leaders and team members are part of a unique dyadic relationships (Graen & Uhl-Bien, 1995). In the case of a high quality LMX, team members are found to receive favorable treatment, gain advantages from their supervisors that their lower quality colleagues do not, and experience increased trust and support (Liden et al., 1997). Simultaneously, one could argue that leaders also play an important role in the structuring of work-life balance, as they distribute the work and thereby determine how challenging balancing work and private life may be. Employees who are

part of high-quality LMX relations could therefore possibly be receiving favorable treatment in such a way that it results in a more positive work-life balance. However, these leaders would have less influence on the techno-overload part of the relationship, as they have no direct influence on the amount of ICT consumed by the employees. The rise of constant connectivity anywhere and anytime through mobile communication tools is still present (Ragu-Nathan et al., 2008), which is something the different relationships between team members and team leaders holds no influence over. Given that leaders may not have as much influence over ICT, leadership may need to be viewed from a different perspective in order to include the organizational level which has more of an influence on the impact techno-overload brings. Hence, leadership needs to be analyzed as a multilevel issue. Leadership is not limited to single dyadic relations, as it is embedded in a broader network of relations with colleagues, leaders, and other aspects of the organizations as a whole (Batistič, Černe, & Vogel, 2017). Taking a multilevel leadership perspective into account, one could argue that a direct supervisor may have influence on the work-life balance of a team member (e.g. offering flexible arrangements, distribution of tasks), while the issue of techno-overload is part of a more multilevel organization wide structural issue which would require a leadership focus at higher levels of analysis (e.g. middle management, senior management).

With regards to the demographic profile of the participants, no significant relation was found between work-life balance and age, gender, contract type or employment sector. However, regarding education a significantly higher work-life balance rating was found for employees with a technical education background as compared to those with a higher education background. This counteracts the argument of Meyer and Maltin (2010), who expected a higher education background to feature a more positive work-life balance. These findings could be explained

following the notion of COR theory (Hobfoll, 1989), arguing that this change in work-life balance rating is contingent on the employees' capabilities to manage their resources. A possible explanation would be that these employees either have received more effective training on how to manage their resources during their education, or that their careers are more suited for positive resource management. Alternatively, these careers may simply have less spillover between work and life, allowing them to have a better work-life balance.

### **Limitations and future research**

This study has a number of limitations that should be addressed. Firstly, the design of this study is cross-sectional, meaning that the data was measured at one point on time. This may not be the most effective way of analysing employees on the subject of technological demands, as technological characteristics are currently changing and developing very quickly (Mazmanian, 2013). As such, future research would be advised to devise a longitudinal study to measure the impact of technological changes over time. Additionally, a longitudinal study would offer the possibility to offer new insights into the long term effects of techno-overload, WLB and LMX. As stated earlier, employees using ICT for after work purposes run the risk of exposing themselves to increased high physiological and psychological stresses (Hobfoll & Freedy, 1993; Gorgievski & Hobfoll, 2008). This impedes the ability to maintain resources following the notion of COR theory, which may result in a so called 'loss spiral' which sees a consistent loss of the ability to maintain resources (Hobfoll, 1989). Maintaining a loss spiral for a long amount of time may have various negative effects for employees, making techno-overload possibly more damaging long-term. Concerning WLB, ICT use has been found to be negatively related to psychological detachment (Barber & Jenkins, 2014), which in turn is associated with increased work-life conflict (Richardson & Thompson, 2012). Similarly to techno-overload, employees

experiencing psychological detachment and the associated increase in work-life conflict may find themselves part of a negative spiral where this relationship becomes strengthened, which would be something for a longitudinal study to investigate. Furthermore, the relatively small sample size brings a limitation to conclusions made over the entire population. In the case of smaller sample sizes, one should avoid making very strong conclusions based on the outcomes (Hackshaw, 2008). Instead, the results presented in this study are in favour of arguing for a strong evidence towards a certain effect with some careful interpretation. Still, this research does provide a number of significant findings supported by theory and should therefore be replicated by future research using larger samples.

Secondly, this study is limited to the analysis of the dyadic relationship regarding leadership, lacking a multi-level approach which would encompass leadership in the various organizational levels as a whole. This study did not feature a multi-level approach since the sample size is lower than the required size of 200 respondents (Hox, Moerbeek, & Van de Schoot, 2010). As the scope of LMX is limited to the dyadic relationship between team leader and team member, it fails to incorporate higher levels such as unit or organization which help shape and determine the impact of leadership (Batistič et al., 2017). Therefore, this paper suggests future research to include a multi-level perspective in order to get a better understanding of leadership and its relation to techno-overload and employees' work-life balance. Introducing a broader multi-level perspective will help study leadership dynamics on different levels (i.e. line managers, senior management) and will thereby open up new routes into researching leadership as a whole.

Finally, this study is limited to the investigation of a specific leadership approach in the form of LMX. While the results did contribute to existing literature with a number of interesting

findings, these findings could be considered limited to this leadership style in particular. Future research interested in investigating LMX could also view LMX from a new perspective, namely the distinction between social LMX relationships (S-LMX) and economic LMX relationships (E-LMX) (Kuvaas, Buch, Dysvik, & Haerem, 2012). Including a distinction between S-LMX (which focuses on the long-term socio-emotional aspects of a dyadic relationship) and E-LMX (which emphasizes short-term economically oriented transactions in a dyadic relationship) may offer new insights into the effects of leadership. Alternatively, there are many different leadership styles and theories which may have different impacts on the relationship between techno-overload and work-life balance. A suggestion for future research with regards to different leadership styles would be to investigate a number of digital leadership characteristics which are emerging due to the new digital environment. Petry (2018) distinguishes digital leadership styles based on networking leadership, open leadership, agile leadership and participative leadership. Each of these digital leadership styles offer differing influences of leadership on the relation between techno-overload and WLB. Alternatively, since this research focuses on the positive effects of LMX, future research could explore the “dark side” of LMX, techno-overload and WLB. Harris et al. (2015) found that a high quality LMX strengthened the negative effect of techno-overload on work-life balance. A possible explanation suggests leaders part of a high-quality LMX provide more information to team members, in return expecting better and increased output. As such, more work is demanded from the employee, making the management of their resources more challenging and thereby negatively affecting their work-life balance. This line of research is still in its infancy and could therefore be interesting for future research to pursue.

### **Practical implications**

This study offers a number of practical implications for managers in particular. While many benefits for the widespread use of ICT certainly exist, this study brings to attention a number of effects that are detrimental to employees in the form of stress and lack of control. Employees facing mental ill-health or work-related stress is associated with high costs (Hassard et al., 2014), and therefore it is in the employer's best interest to reduce these as much as possible. Employees feeling in control are crucial for the beneficial use of ICT (Schlachter, McDowall, Cropley, & Inceoglu, 2018) and managers play an important part in guiding their employees and setting (normative) boundaries in terms of work and non-work life spillover. As such, team leaders are suggested to provide formal guidelines for employees using ICT during non-work time in order to preserve the work-life balance as much as possible. In order to make team leaders aware of their LMX relations with team members, both from a dyadic and a multi-level perspective, organizations should provide trainings in order to become aware of the challenges discussed in this paper. In general, any training that would aid team leaders in supporting their team members in building and maintaining their resources is expected to help face these challenges. In particular, training should focus on making team leaders aware on the positive effects of constructive leadership relations which could be achieved by i.e. increased guidance, personal training, communication, and individual direction (Schaufeli, 2015).

### **Conclusion**

The research question of this paper was: *“To what extent is techno-overload related to employees’ work-life balance and how is this relation moderated by the LMX between an employee and their manager?”* To answer this question, findings indicate that techno-overload is negatively related to work-life balance while only a partial moderation was found in the form of a high-quality LMX. With the embeddedness of ICT use expected to continue its rise, building a

greater understanding of the workings of techno-overload, leadership and work-life balance will serve as an important platform for the coming decades. As research on this field of study is currently in its infancy, these findings are interesting to those who are looking towards facing the challenges of the future related to the effects of digitalization in the field of HR. Technological advancements in the digital domain progress rapidly, and if HR wants to strengthen its foothold as a strategic partner in the organizational world a deeper understand of ICT's modern day challenges to come will prove to be fundamental.

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## Appendix

### Appendix 1. items and factors loadings (PAF)

		Techno- overload	Leader- member exchange	Work- life balance
OVL1	... word ik gedwongen veel sneller te werken	.653		
OVL2	... word ik gedwongen meer werk te doen dan ik aankan	.859		
OVL3	... word ik gedwongen met zeer strakke tijdschema's te werken	.834		
OVL4	... word ik gedwongen mijn werkgewoonten aan te passen	.693		
OVL5	... heb ik een hogere werklast vanwege de toegenomen complexiteit	.756		
LMX1	Mijn supervisor begrijpt mijn problemen en behoeften		.827	
LMX2	De werkrelatie met mijn supervisor is effectief		.929	
LMX3	Ik weet meestal hoe tevreden mijn supervisor is met wat ik doe		.831	
WLB1	Ik ben tevreden met de manier waarop ik mijn tijd verdeel tussen mijn werk en privé- of gezinsleven			.921
WLB2	Ik ben tevreden met de manier waarop ik mijn aandacht verdeel tussen werk en thuis			.943
WLB3	Ik ben tevreden met hoe goed mijn werkleven en privé- of gezinsleven bij elkaar passen			.856
WLB4	Ik ben tevreden met mijn vermogen om de behoeften van mijn werk te balanceren met die van mijn privé- of gezinsleven			.876
WLB5	Ik ben tevreden met de mogelijkheden die ik heb om mijn werk goed te doen en toch in staat te zijn om huishoudelijke taken uit te voeren			.773